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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/566,238

01/30/2006

Toshihiko Ouchi

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EXAMINER

ELEY, JESSICA L

ART UNIT

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/566,238	<b>Applicant(s)</b> OUCHI, TOSHIHIKO	
	<b>Examiner</b> JESSICA L. ELEY	<b>Art Unit</b> 2884	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 30 January 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 January 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>09/22/2006; 08/14/2007; 11/08/2007</u> .                      | 6) <input type="checkbox"/> Other: _____                          |



## **DETAILED ACTION**

### ***Specification***

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: Terahertz Sensing Apparatus using a Transmission Line.

### ***Information Disclosure Statement***

The information disclosure statement filed 8 November 2007 fails to comply with the provisions of 37 CFR 1.97, 1.98 and MPEP § 609 because the Tanaka NPL document does not have a date of publication and is therefore not considered. It has been placed in the application file, but the information referred to therein has not been considered as to the merits. Applicant is advised that the date of any re-submission of any item of information contained in this information disclosure statement or the submission of any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the statement, including all certification requirements for statements under 37 CFR 1.97(e). See MPEP § 609.05(a).

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

**Claims 1, 2, and 10** are rejected under 35 U.S.C. 102(b) as being anticipated by Rudd  
US 6,320,191 B1.

Regarding **claim 1**, Rudd teaches a sensing apparatus (FIG. 1) comprising:

A dipole antenna **98** as taught by Rudd is composed of bias electrodes **92** composed of thin electrode lines, i.e. a transmission line, for propagating an electromagnetic wave there through (Rudd, column 7 lines 5-6); and

A detection means **20** for detecting propagation state of the electromagnetic wave at an arbitrary location on the transmission line (column 7 lines 19-21),

Wherein an interaction between a sample/object disposed in the vicinity of the transmission line and the electromagnetic wave is detected (column 7 lines 15-29).

Regarding **claim 2**, Rudd teaches the sensing apparatus according to claim 1, further comprising an electromagnetic wave generating means **12**.

Regarding **claim 10**, the sensing apparatus taught by Rudd is provided with a resonance structure, dipole antenna **98** for confining a propagating electromagnetic wave.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

**Claims 3 and 4** are rejected under 35 U.S.C. 103(a) as being unpatentable over Rudd US 6,320,191 B1 and further in view of Brener et al. US 5,729,017 (henceforth referred to as Brener).

Regarding **claims 3 and 4**, Rudd teaches the sensing apparatus according to claim 1, further comprising an electromagnetic wave generating means **12** but this means is not disposed on a same substrate as the antenna/transmission line. However, Rudd incorporates by reference the teachings of Brener (Rudd, column 6 lines 56-59). The teachings of Brener include a terahertz generator and detector composed from a dipole antenna on the same substrate (FIG. 1), wherein the generating means is of a current-injection type (column 2 lines 51-55). It would be obvious to a person of ordinary skill in the art at the time the invention was made to make the electromagnetic wave generating means taught by Rudd on the same substrate as the antenna as taught by Brener, since the teachings in Brener are directly incorporated into Rudd.

**Claims 5 and 6** are rejected under 35 U.S.C. 103(a) as being unpatentable over Rudd US 6,320,191 B1 and further in view of van der Weide US 5,936,237 (henceforth referred to as Weide).

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Regarding **claims 5 and 6**, Rudd teaches the sensing apparatus of claim 1, but does not specifically teach an embodiment wherein the detection means comprises a thin-line shaped probe. However, THz detection probes are well known in the art. Weide for example teaches a THz detection probe comprised of a thin-line shape with a tip of a diameter which is less than 10 micrometers (column 9 lines 53-55) which is not more than 1/10 of the wavelength of the propagating wave of 3 THz as taught by Rudd (column 6 lines 60-62). It would be obvious to one of ordinary skill in the art at the time the invention was made to use the probe taught by Weide as the detection means for the imaging apparatus taught by Rudd, since Weide directly teaches using the scanning probe with THz dipole antennas (column 8 lines 39-49).

**Claims 7, 8, and 12-14** are rejected under 35 U.S.C. 103(a) as being unpatentable over Rudd US 6,320,191 B1 and further in view of Nuss US 5,710,730.

Regarding **claim 7**, Rudd teaches the sensing apparatus according to claim 1 wherein the detection means detects the propagation state (column 3 lines 20-23) but does not do so at a plurality of locations. The teachings of Nuss which are incorporated by reference teach the electromagnetic radiation receiver collecting individual signals propagating through distinct points on the object and processing these signals to create an image of the object (column 1 lines 44-48). It would be obvious to a person of ordinary skill in the art at the time the invention was made to detect the propagation state at a plurality of locations as this would be the natural combination if one of ordinary skill in the art were following the teachings in Rudd which direct one to the teachings of Nuss for characterizing certain materials and objects (Rudd column 7

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lines 12-16) and Nuss teaches collecting signals propagating through spatially separate points on the object (Nuss column 1 lines 44-48).

Regarding **claim 8**, the disclosures of Rudd and Nuss address all the limitations of parent claim 7, as discussed above. The teachings of Nuss further teach the change in positional relationship by scanning (column 1 lines 44-48).

Regarding **claim 12**, Rudd teaches a sensing apparatus comprising:

A dipole antenna **98** as taught by Rudd is composed of bias electrodes **92** composed of thin electrode lines, i.e. a transmission line, for propagating an electromagnetic wave there through (Rudd, column 7 lines 5-6); and

A detection means **20** for detecting propagation state of the electromagnetic wave at an arbitrary location on the transmission line (column 7 lines 19-21),

Wherein an interaction between a sample/object disposed in the vicinity of the transmission line and the electromagnetic wave is detected (column 7 lines 15-29).

Rudd does not teach the device containing a flow path disposed in the vicinity of the transmission line, for allowing an object to move therein. However, such an embodiment is obvious in light of the teachings of Nuss which are incorporated by reference to the teachings of Rudd (Rudd column 7 lines 12-16). Nuss teaches imaging substances such as liquid and gas using terahertz electromagnetic radiation (column 1 lines 30-31). Thus it would be obvious to one of ordinary skill in the art at the time the invention was made to include a flow path disposed in the vicinity of the transmission line, for allowing an object to move in order to allow for the terahertz spectroscopy of liquids and gases as taught by Nuss in the passage cited above.



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Regarding **claim 13**, the disclosures of Rudd and Nuss address all the limitations of parent claim 12 as discussed above. It would be obvious to a person of ordinary skill in the art at the time the invention was made to detect the propagation state at a plurality of locations as this would be the natural combination if one of ordinary skill in the art were following the teachings in Rudd which direct one to the teachings of Nuss for characterizing certain materials and objects (Rudd column 7 lines 12-16) and Nuss teaches collecting signals propagating through spatially separate points on the object (Nuss column 1 lines 44-48).

Regarding **claim 14**, the sensing apparatus taught by Rudd used the preferred frequency range of 50 GHz to 5 THz for the electromagnetic wave. However, it would be obvious to one of ordinary skill in the art at the time the invention was made to extend the range to include 30 GHz to 30 THz since Rudd teaches that the range of 50 GHz to 5 THz is only the preferred mode, but any electromagnetic frequency above or below this preferred range is possible (column 6 lines 59-62).

**Claim 9** is rejected under 35 U.S.C. 103(a) as being unpatentable over Rudd US 6,320,191 B1 and Nuss US 5,710,730 as applied to parent claim 7 and further in view of Zhang et al. US 5,952,818 (henceforth referred to as Zhang).

Regarding **claim 9**, the disclosures of Rudd and Nuss address all the limitations of parent claim 7 but do not teach an electrooptic crystal. However using an electrooptic crystal is common in the art of THz sensing. Zhang teaches a method for characterizing free-space using an electro-optic crystal (abstract) where the crystal provides usable knowledge of the entire terahertz waveform, including both amplitude and phase (column 5 lines 36-42). It would be

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obvious to a person of ordinary skill in the art at the time the invention was made to use the electro-optic crystal taught by Zhang as part of the detection means for Rudd and Nuss since this crystal provides the ability to obtain usable knowledge of the entire terahertz waveform.

**Claim 11** is rejected under 35 U.S.C. 103(a) as being unpatentable over Rudd US 6,320,191 B1.

Regarding **claim 11**, the sensing apparatus taught by Rudd wherein the electromagnetic wave has a frequency within the range of 50 GHz to 5 THz. However, it would be obvious to one of ordinary skill in the art at the time the invention was made to extend the range to include 30 GHz to 30 THz since Rudd teaches that the range of 50 GHz to 5 THz is only the preferred mode, but any electromagnetic frequency above or below this preferred range is possible (column 6 lines 59-62).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JESSICA L. ELEY whose telephone number is (571)272-9793. The examiner can normally be reached on Monday - Thursday 8:00-6:30 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. L. E./

Examiner, Art Unit 2884

/David P. Porta/

Supervisory Patent Examiner, Art Unit 2884